UNPUBLISHED SURVEY & CONTROL REPORTS

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MISCELLANEOUS REPORT NO. 25

LARCH SAWFLY CONDITIONS IN THE LAKE STATES IN 1953

A Reconnaissance Survey

By L. C. Beckwith, Entomologist

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Lake States Forest Experiment Station

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January, 1954

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LARCH SAWFLY CONDITIONS IN THE LAKE STATES IN 1953

A Reconnaissance Survey

By L. C. Beckwith[1/]

A general outbreak of the larch sawfly, Pristiphora erichsonii (Htg.) which developed throughout the tamarack stands in northern Minnesota during the late 1940's still continues. A general, although light, increase in populations of the insect has also occurred in Wisconsin and Michigan, but not to such a widespread degree as in Minnesota. In 1953, for the third year, reconnaissance surveys were undertaken to determine the extent of the infestation in the Lake States. Only a small scale ground survey was conducted in Wisconsin and Michigan because of the lightness of the present infestation. An aerial survey and an extensive ground survey were completed in the northern half of Minnesota.

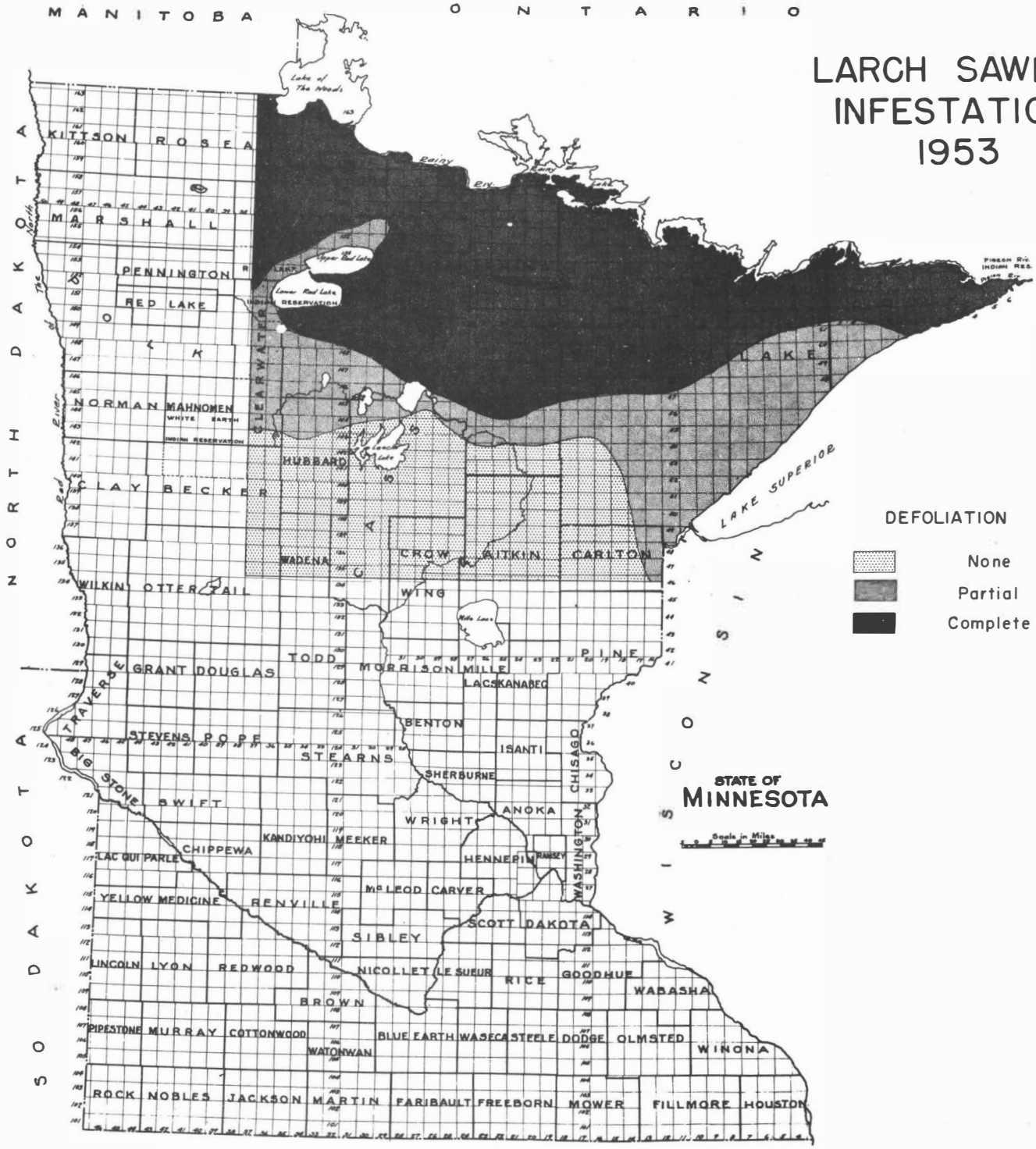
AERIAL RECONNAISSANCE

The aerial reconnaissance in 1953 was made possible by a continuance of the close cooperation between the office of the State Entomologist of Minnesota and the Milwaukee Forest Insect Laboratory. A Cessna 170-B, 4-place high wing monoplane was made available by the Aircraft and Special Equipment Center, of the Bureau of Entomology and Plant Quarantine. The operation recorder, used in the previous aerial surveys, was not received in time for its use in 1953. Instead, the tamarack types were mapped in along flight lines placed on Sectional Aeronautical Charts. Only three stand condition categories were used in 1953 as compared with five and six that were used in 1951 and 1952 respectively. These categories were: (1) no defoliation; (2) partial defoliation; (3) complete defoliation. No attempt was made to separate the no defoliation category into susceptible and non-susceptible because it is believed this cannot be done with consistent accuracy from the air. Pencils of different colors were used to indicate the three degrees of defoliation on the charts.

Approximately 15,000,000 acres of land area, of which 450,000 acres were tamarack, was surveyed between July 22 and August 4. This included four days of bad weather conditions that prevented flying. The observation of a 2-mile strip at twelve mile intervals produced a 16.7 percent cruise of the entire area.

[1/] The author expresses his appreciation to T. Aamodt and H. Graber, of the office of the State Entomologist of Minnesota for their assistance in the aerial observations and to pilot A. Gieser of the BE&PQ Aircraft and Special Equipment Center. Thanks are also due A. T. Drooz, of the Milwaukee Forest Insect Laboratory and Field Aides C. Lincoln and D. Wallesz for their assistance during the ground survey.

LARCH SAWFLY INFESTATION 1953



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The approximate acreage of tamarack in each defoliation class was determined for those counties that were completely covered by the aerial surveys (Table 1). Some counties were omitted from the table, although they may have been partly covered during the survey, because it was considered very inaccurate to base conditions over the whole county only on that part actually covered by the survey. The data on the total acreage of tamarack within each county were obtained from forest survey information collected by the Lake States Forest Experiment Station. Flight lines and swamp type previously recorded, were omitted from the 1953 Aerial Survey Map in order to emphasize more clearly the distinction between the different defoliation zones.

DISCUSSION

The Cessna 170-B is an ideal plane to use on this type of survey because of its excellent visibility, spacious cabin, and slow-stalling speeds. The Sectional Aeronautical Charts, used in 1953, were a big improvement over the County Highway Maps that have been used in the past. The scale of the chart is approximately 1/3 that of the county maps; and the limited extra detail of the latter does not justify their use. The smaller aeronautical chart can be more easily handled by each observer, and has sufficient detail of physical features for the purpose of the survey. The different types can be mapped in with equal facility. Also, it is believed the aeronautical charts can be adapted for use along with the operation recorder to better advantage than the much larger highway maps.

Again in 1953, precise comparisons cannot be made with the previous aerial surveys because they were flown under different conditions. In general, the 1953 survey was more complete than the 1952 survey in that more area was covered by the flight. It appears that the zone of complete defoliation is increasing and shifting north. In 1953, the entire northern section of the area surveyed suffered complete defoliation, whereas in 1952 only partial defoliation occurred over large areas in Koochiching, St. Louis, Lake and Cook Counties, especially along the Canadian Border. Flight line coverage of this area was more complete in 1953 and may account for this apparent change. In the southern halves of St. Louis, Lake and Cook Counties defoliation was partial this year as compared to complete last year.

The total cost of the 1953 aerial survey was $1,196.00, approximately $0.08 for each 1,000 acres of total land area. This was $0.01 lower per 1,000 acres than the 1952 survey. This decrease in cost probably resulted from the use of a bureau plane in 1953 and an increase in the total land area covered over that of 1952. A breakdown of the cost is as follows:

Salaries -	$600.00
Per diem -	429.61
Plane maintenance -	166.40
Total	$1196.01

The salary and per diem items cover the writer, the pilot and one State employee. The salary and per diem of only one State man was included as the two State men participating alternated in tours of duty as an observer.

RECOMMENDATIONS

It may be advisable to investigate different methods of conducting the aerial survey to further improve upon it. Such investigations would be conducted on height of flight, width of strip, speed of plane and the distance between flight lines. These may have to vary with the topography to best sample the area. The aeronautical charts should be used with the operation recorder to see if this is more satisfactory than the method using highway maps. It is also advisable to eliminate Cook and Lake Counties from future aerial surveys because the tamarack stands are too scattered and limited in acreage to make it a practical operation. These stands could be investigated by means of ground surveys, if necessary.

Table 1.--Estimated acreage of tamarack by defoliation categories in northern Minnesota

County	Total Area of Tamarack	Defoliation					
		None		Partial		Complete	
	Acres	Acres	Percent	Acres	Percent	Acres	Percent
Beltrami	64,400	5,796	9	19,320	30	39,284	61
Cass	39,100	31,671	81	5,865	15	1,564	4
Cook	89	-	-	60	67	29	33
Hubbard	3,900	2,964	76	819	21	117	3
Itasca	38,600	3,474	9	8,106	21	27,020	70
Koochiching	148,000	16,280	11	20,720	14	111,000	75
Lake	24,000	480	2	20,160	84	3,360	14
Lake of the Woods	62,000	1,240	2	17,360	28	43,400	70
St. Louis	77,800	23,340	30	24,896	32	29,564	38
Total	457,889	85,245	18	117,306	26	255,338	56

GROUND RECONNAISSANCE

The ground reconnaissance in 1953 followed the same procedure used in 1952. Scattered roadside sampling areas were examined in northern Minnesota, Wisconsin and upper and lower Michigan. The original locations in Wisconsin and Michigan were again used in 1953 as well as most of the original locations in Minnesota (Table 2). Defoliation was estimated to the nearest five percent on each of 10 marked sample trees and the average defoliation for the sampling area was computed.

Cocoon samples were again made in each area to obtain an indication of the population that had been present and to see if there might be any correlation with the amount of defoliation of the trees. Each sample was based on a 6-minute collection under each of the ten sample trees giving a 1-man hour collection for each area. Again in 1953, there does not appear to be any correlation between the amount of defoliation and the number of cocoons collected (Table 2). This entire lack of correlation may possibly be due to rodent predation and the differences between collection sites. Soil types and ground conditions vary between stands and even between trees so that ease of collection also varies. Thus it is possible that collections may be very difficult in a stand that is completely defoliated and very easy in a stand that is only 25 percent defoliated. All the sawfly cocoons that were collected are presently being stored in temperature and humidity controlled rooms at the Forest Products Laboratory, Madison, Wisconsin. The cocoons are being held at 36°F. and 80-90 percent relative humidity until sometime in February, when they will be brought to room conditions and dissected to determine the parasite and disease complex, and the percent of cocoon survival.

As in previous years, the larch sawfly infestation in 1953 was far more extensive and severe in northern Minnesota than Wisconsin and Michigan. The average percent defoliation for the sampling areas in Minnesota was 84, as compared to 57 and 71 in 1951 and 1952 respectively. St. Louis and Lake Counties combined averaged 94 percent in contrast to 87 percent in 1952. The defoliation in Cook County showed a large increase, averaging 65 percent with a range of 55-75; in 1952 it averaged 23 percent with a range of 5-40. The northcentral part of the state also showed an increase in defoliation over that of 1952.

As compared to Minnesota, the larch sawfly is scarce in Wisconsin, although it is reported over a larger area than in 1952. The 4 roadside sampling areas included in the ground survey showed very light defoliation, never reaching the 5 percent level. It appears that the population is increasing in the northwestern part of the state and it may be advisable to increase the number of plots in that part of the state so as to follow population trends in a young infestation.

The sawfly was very scarce in both the upper and lower peninsulas of Michigan. Of 9 sampling areas, only one, in Gogebic County, showed any trace of the sawfly, and this was less than 5 percent defoliated. Permanently marked trees were not set up in these areas because of the lightness of the infestation.

The one-tenth acre plots that were set up with the permanent sampling areas in Minnesota in 1952, were closely checked again for the presence of the larch beetle, Dendroctonus simplex Lec. None of the plots contained trees that were infested with this bark beetle, although areas 2 and 18 each contained one infested tree outside of the plot. At one end of sampling area 2, near Spooner, Minnesota, a large number of fire-scarred trees attracted the beetles. Area 18 was a very wet site and

tree vigor was very poor. Area 3, at Waskish, was dropped from the survey in 1953. This plot contained 2 trees infested with bark beetles in 1952 and practically all the trees were infested in 1953. The owner was logging the stand to try and salvage the wood. The stand, occurring on a degenerated tamarack site, contained a large number of overmature trees.

Area 1, near Warroad, was also dropped from the 1953 survey because of the poor quality trees and the large number of porcupine girdled trees. A new plot was established south of Williams to represent this section of the state. Until 1953, the presence of broad drainage ditches and the inaccessibility of the stands has prevented the establishment of sampling areas in Koochiching County. This was unfortunate as this county contains 148,000 acres of tamarack, by far the largest amount of any county in the state. In 1953, two sampling areas were set up in this county, one being reached by crossing the drainage ditch in a rubber boat. These sampling areas are located near Littlefork and Big Falls and averaged 65 and 70 percent defoliation respectively. Bark beetles were not found in these although they are present in an area near Big Falls where a telephone line was recently erected. Sampling areas were not established in Aitkin or Pine Counties as planned because of lack of time.

The larch casebearer, Coleophora laricella, (Hon.) was present in both Wisconsin and Michigan but to a lighter degree than in 1952.

Table 2.--Larch sawfly ground reconnaissance defoliation estimates

Sampling Area	State	County	T.	R.	S.	1951	1952	1953	No. Cocoons per man hour 1953
1	Minnesota	Roseau	163N	37W	21	5	10	-	-
1a	"	Lake of the Woods	161N	34W	35	-	-	70	230
2	"	"	159N	31W	12	5	95	90	238
3	"	Beltrami	154N	30W	9	50	100	-	-
3a	"	Koochiching	154N	25W	20	-	-	65	30
3b	"	"	157N	25W	25	-	-	70	94
4	"	Beltrami	149N	31W	29	60	85	80	152
5	"	Itasca	148N	28W	18	Trace	30	100	210
6	"	Cass	141N	30W	3	40	25	50	372
7	"	"	142N	28W	14	30	65	90	375
8	"	Itasca	145N	25W	13	10	100	95	268
9	"	"	147N	25W	1	5	100	90	117
10	"	St. Louis	65N	19W	29	40	40	95	231
11	"	"	62N	18W	6	80	80	100	216
12	"	"	60N	17W	22	100	100	95	126
13	"	"	59N	15W	22-23	100	95	95	154
14	"	"	60N	15W	12	100	95	100	54
15	"	"	62N	12W	8-17	80	70	90	161
16	"	Lake	55N	11W	18	100	100	75	201
17	"	"	58N	10W	32	90	85	95	265
18	"	"	60N	10W	27	100	100	95	200
19	"	"	59N	8W	27	100	100	100	157
20	"	"	59N	6W	2	100	90	95	235
21	"	Cook	62N	4W	7	80	40	75	299
22	"	"	65N	4W	24	5	5	55	267
23	"	"	63N	1E	34	40	25	65	293
		Average				57	71	84	210
24	Wisconsin	Bayfield	47N	9W	9	-	Trace	Trace	-
25	"	Washburn	37N	12W	(?) 36	0	0	0	-
26	"	Price	39N	1W	12	0	0	Trace	-
27	"	Oconto	32N	16E	17	0	0	0	-
		Average				0	Trace	Trace	-
28	Michigan	Gogebic	47N	46W	32	Trace	Trace	Trace	-
29	"	Baraga	48N	32W	9	Trace	0	0	-
30	"	Delta	40N	21W	5	0	0	0	-
31	"	Alger	49N	14W	36	0	0	0	-
32	"	Chippewa	46N	6W	16	0	0	0	-
33	"	Mackinac	42N	1W	27	0	0	0	-
34	"	Cheboygan	34N	1E	9	0	0	0	-
35	"	Iosco	24N	7E	27	0	0	0	-
36	"	Wexford	22N	10W	22	0	0	0	-
		Average				Trace	Trace	Trace	-